ARCADIAN
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THIS FAT ISSUE is the last for the 1980 fiscal year. The next issue, November, will be the first of Volume Three. Again, we've had a number of issues over and above the guaranteed minimum of 6 per year, and actually more pages than last year's volume. The main reason to stop at this point is to allow my wife and myself the luxury of a month's vacation to celebrate our twenty-fifth anniversary. Hopefully, the extra material in this issue will tide you over until we return and have the opportunity to prepare the next issue from all the material you will have continued to send in. While we will have a house-sitter, there won't be anyone around to do anything about telephone calls. Mail will be picked up by one of the local elves, if an "A" or "ARCADIAN" appears on the envelope.

SINCE this is the end of Volume Two, it follows that subscriptions for Volume Three are now due. I'll continue the guarantee of at least 6 issues, as I have in the past. There were 5 'extras' in Volume One and 4 in Volume Two under that scheme. The rate for the next Volume will be $12.50, partly in anticipation of a postal increase rumored for November, partly to worry about the proposed 9-digit Zip Code we may have to reprogram the address list for, and partly to allow for some increase in productivity in preparing and distributing the paper. For example, it takes 2 hours of work per 100 copies, between receipt from the printer and delivery to the post office. I'd like to decrease that labor cost and mechanize the operation a little more, but that costs money. Recall that this is a part-time hobby operation, and there are other things that call upon my time.

AN INCREASE in the number of subscribers would be a more palatable way to increase revenues, so why don't you make it a personal goal to induce a Bally buddy to have his own subscription, and I'll consider a rate reduction... Each of the little projects and publications is priced to stand alone, but a peculiarly large amount of money is consumed by the little nickle and dime (quarter and half?) things like extra postage, telephone, gas to the printer, lost mail, etc., that in the aggregate become a considerable sum.

USER GROUPS are encouraged, for when a couple of owners can get together, more is accomplished than when working alone - mutual assistance, etc. We've identified a couple of these in past issues and would like more to be developed, especially as we get into more complicated subjects. To further this concept, I'll send additional copies of the ARCADIAN to the same address at a reduced rate - three or more copies to one address at $8.50 per subscription.

WHEN SENDING your subscriptions for next year, it would make things easier if you would put an "S" on the envelope and we can channel those into the right pile to get the next year's address labels made up as soon as possible.

```
MORSE CODE (ENHANCED & CORRECTED)
  10 :RETURN ;CLEAR ;NT=1
  20 BC=RND (32)b8;FC=BC+4+RND (32)b8
  30 PRINT ;PRINT "    MORSE CODE
  40 PRINT ;INPUT "  SPEED?"D
  45 PRINT ;PRINT "TYPE WORDS RUN FOR CODE
  50 PRINT ;PRINT "YOUR MESSAGE:
  60 PRINT ;B=0
  70 B=B+1;N=KP;IF N=106GOTO 200
  80 @(B)=N;TV=N;IF N=31B=B-2
  90 GOTO 70
 200 CLEAR ;FC=0;BC=3;P=0;CY=40;FOR A=1TO B-1
 210 P=P+1;IF P=10P=0;CY=40
 220 N=@(A);NT=0;TV=N;PRINT " ".;NT=D
 230 IF N<44GOTO 300
 240 IF N>90GOTO 300
 250 IF N=47GOTO 300
 260 IF N>57IF N<65GOTO 300
 270 GOSUB Nb10
 275 FOR C=1TO 25bD;NEXT C
 280 NEXT A
 290 GOTO 1000
 300 TV=31;PRINT ;FOR C=1TO 25bD;NEXT C
 310 GOTO 280
```

MORSE CODE MODIFICATION by Bob Weber adds a little enhancement by adding a question at the end - press PRINT to repeat the message, press ERASE to start a new one, & press + to add to the message.

Utilize lines 440 through 1000 as written, with the two corrections added below.

```
1005 CLEAR
1010 B=B-1;NT=0;FOR C=1TO B
1020 TV=@(C);NEXT C;PRINT
1030 PRINT "END OF MESSAGE
1040 IF &(20)=16B=B+1;GOTO 200
1050 IF &(21)=16RUN
1060 IF &(20)=8B=B+1;@(B)=32;PRINT "INPUT ";GOTO 70
1070 GOTO 1040
```

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There were two errors in the listing on p.81:
change 660 to read PRINT"Q ØØ Q Q Q"; RETURN
change 460 to read PRINT"Q Q ØØ Q Q ØØ Q ØØ";RETURN

SALVAGE BOARD CHECKOUT described on p. 80 has a partial error in table 2. I identified chip U14 and pin 16; but it should have been chip U14 and pin 6, as was mentioned in the text.

YAHTZEE ADDITION CORRECTION. The modification presented on p.82 made the dice nice and big, but I made two errors, in lines 380 and 385. Change the first command in each to have a > instead of =, so they read:

```
380  IF Z>1  ...
385  IF Z>3  ...
```

ATTACK MODIFICATION REBUTTAL. Carl Morimoto, author of ATTACK, indicates that the modification I presented on p. 67 will cause the piece to move in two-square increments, which is not the intent. Pieces must stay within the wall constraints.

BASE CONVERSION by Ron McCoy puts it all together. Now you can have one program that will convert from any of the numerical systems into the other four, rather than have to use individual programs. If you start with decimal, the program takes the whole number in one piece and converts it. If you start with any of the other four, you have to enter each digit; as with Hex- to enter 23AC, enter 2 GO 3 GO A GO C GO and thats it.

```
 1 .BASE CONVERSION
 2 . RON MCCOY
 3 .  MAY 30, 1979
 4 .SZ=385
 5 :RETURN
10 CLEAR
20 PRINT "INPUT KNOWN BASE
30 PRINT "    B,D,H OR O";PRINT
40 P=KP;IF (P="B")+(P="D")+(P="H")+(P="O")GOTO 60
50 PRINT "*INVALID-TRY AGAIN*";GOTO 240
60 IF P="D"INPUT "INPUT #"S;GOTO 240
70 PRINT "INPUT (W/ LEADING 0'S
90 IF P="O"GOTO 180
100 IF P="B"GOTO 510
109 .HEX TO DECIMAL
110 A=10;B=11;C=12;D=13;E=14;F=15
120 PRINT "4 DIGIT HEX #
130 INPUT W,X,Y,Z
140 IF (W>7)+(X>15)+(Y>15)+(Z>15)PRINT "T00 BIG";GOTO 120
150 S=(4096bW)+(256bX)+(16bY)+Z
160 GOTO 220
179 .0CTAL TO DECIMAL
180 PRINT "5 DIGIT 0CTAL #
190 INPUT V,W,X,Y,Z
200 IF (V>7)+(W>7)+(Y>7)+(Z>7)PRINT "T00 BIG";GOTO 180
210 S=(4096bV)+(512bW)+(64bX)+(8bY)+Z
220 PRINT ;PRINT #1,S," DECIMAL
239 .BINARY TO DECIMAL
240 Q=Sc2
250 O=RM
260 FOR R=311TO 324
270 Q=Qc2
280 GOSUB R
290 NEXT R
300 GOTO 330
311 N=RM
312 M=RM
313 L=RM
314 K=RM
315 J=RM
316 I=RM
317 H=RM
318 G=RM
319 F=RM
320 E=RM
321 D=RM
322 C=RM
323 B=RM
324 A=RM;RETURN
330 PRINT #1,A,B,C," ",D,E,F,G," ",H,I,J,K," ",L,M,N,O," BINARY
339 .BINARY TO HEX
340 Z=O+(2bN)+(4bM)+(8bL);IF Z>9Z=Z+7
350 Z=Z+48
360 Y=K+(2bJ)+(4bI)+(8bH);IF Y>9Y=Y+7
370 Y=Y+48
380 X=G+(2bF)+(4bE)+(8bD);IF X>9X=X+7
390 X=X+48
400 W=C+(2bB)+(4bA)
410 W=W+48
419 .BINARY TO 0CTAL
420 V=O+(2bN)+(4bM)
430 U=L+(2bK)+(4bJ)
440 T=I+(2bH)+(4bG)
450 S=F+(2bE)+(4bD)
460 R=C+(2bB)+(4bA)
480 TV=W;TV=X;TV=Y;TV=Z;PRINT " HEX
490 PRINT #1,R,S,T,U,V," 0CTAL
500 PRINT ;GOTO 20
509 PRINT "T00 BIG
510 PRINT "15 DIGIT BINARY #
520 INPUT A,B,C,D,E,F,G,H,I,J,K,L,M,N,O
530 IF (A>1)+(B>1)+(C>1)+(D>1)+(E>1)+(F>1)+(G>1)+(H>1)+(I>1)+
    (J>1)+(K>1)+(L>1)+(M>1)+(N>1)+(O>1)GOTO 509
540 S=(16384bA)+(8192bB)+(4096bC)+(2048bD)+(1024bE)+(512bF)+
    (256bG)+(128bH)+(64bI)+(32bJ)+(16bK)+(8bL)
550 S=S+(4bM)+(2bN)+O
560 GOTO 220
```

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BALLY WAS SPOTLIGHTED during Personal Computing 80, the fifth annual personal computing and small business computer show, held in Philadelphia on August 21-24. The "largest personal computing show in 1980" devoted 2½ hours during the Visual Arts Festival held on Sunday and sponsored by the Philadelphia Area Computer Society, to the Bally Home Computer System. The topic, "Low Cost Pixel Art" was presented by Zuszsanna Molnar and Frank Dietrich of Chicago Circle, University of Illinois and Professor Lou Katz and Jinko Gotoh of Columbia University. Discussions supported by video tape included interactive programs for graphics, real time animation, and the new Bally ZGRASS System. The marketing tape on the ZGRASS system ($2800 with monitor) was quite impressive: four times the video resolution of the current Bally Arcade, 64K of memory, floating-point arithmetic with trig functions, and other great features. Topping the show off with a visit to the Bally Park Place Casino in nearby Atlantic City made it a memorable weekend - (No winnings to report!)

(above report direct from Karen Phelps Cravedi of the Tidewater Computer Club - I can use more ready-to-print material, thanks Karen)

PROGRAMMING HINTS listed below were extracted from an article by Steve Kimmel in the August Creative Computing (p.64) are are submitted as guides for the types of programs to write:

- Don't write the program if you are going to do the job only once or twice a year.
- Don't write a program if a human could do the job in less than 5 minutes.
- Don't write a program if you could do it better with a calendar and pencil, file boxes and cards, or a calculator.
- Don't write a program if you don't need the accuracy.

TOUCHTONE modification by Rich Tietjens, now settling down at Monterey ,CA for a few months.

```
 65 IF ((N 47)+(N 58))-((N 64)+(N 69))-(N=42)-(N=35) GOTO 7Ø
 67 GOTO 3Ø
287 C=119; R=188; RETURN
294 C=146; R=188; RETURN
317 C=109; R=253; RETURN
318 C=109; R=230; RETURN
319 C=109; R=208; RETURN
320 C=109; R=188; RETURN
```

BOTS program by Ron McCoy is a challenge. Modified from a program in the June 1979 Personal Computing, it sets up a 9x19 grid on the screen. Fifteen "walls" are randomly placed in the squares, and the 15 "bots"(*) are also randomly placed. Then your position is similarly located. Hand controller 1 is used to move the target (you) in any of the eight available directions, or stand still, and the trigger makes it happen. (The knob is used to turn a little indicator to the desired direction.) After you make your move, all the bots start to advance upon you, one square at a time, each. If they hit a wall, they disappear. The object is to wipe them out, but it is a difficult job. You have to maneuver yourself so that the bots keep hitting walls. I kept saying 'next time I'll get them', to no avail.

```
 1 .
 2 .
 3 .
 4 .BOTS
 5 .BY RON MCCOY
 6 :RETURN
10 CLEAR ;BC=0;FC=142;R=15
12 PRINT "BØTS ARE *'. I'S ARE
14 PRINT "WALLS. BØTS MØVE AT YØU.
16 PRINT "BUT DIE IF THEY HIT A
18 PRINT "WALL. KNØB PØINTS WAY,
20 D=600;I=650;L=700
22 PRINT "TRIGGER MAKES MØVE.
24 FOR A=1TO 999;NEXT A
30 C=0;V=1;N=0;CLEAR
40 FOR Y=-32TO 40STEP 8
50 FOR X=-70TO 63STEP 7
60 C=C+1;@(C)=0;BOX X,Y,6,7,1
70 NEXT X
80 NEXT Y
90 FOR A=1TO R
100 GOSUB D
110 GOSUB I
120 IF @(C)#0GOTO 100
130 CX=0;CY=P;TV=73;@(C)=73
140 NEXT A
150 FOR A=1TO R
160 GOSUB D
170 GOSUB I
180 IF @(C)#0GOTO 160
190 CX=0;CY=P;TV=42;@(C)=1
200 NEXT A
210 GOSUB D
220 GOSUB I
230 IF @(C)#0GOTO 210
240 FOR B=1TO 750
250 BOX 0,P,7,7,2;LINE 0,P,4;BOX 0,P,2,2,1
260 Q=(KN(1)+127)c28
270 IF Q=1LINE 0,P+3,1;M=20
280 IF Q=2LINE O+3,P+3,1;M=21
290 IF Q=3LINE O+3,P,1;M=1
300 IF Q=4LINE O+3,P-3,1;M=-19
310 IF Q=5LINE O,P-3,1;M=-20
320 IF Q=6LINE O-3,P-3,1;M=-21
330 IF Q=7LINE O-3,P,1;M=-1
340 IF Q=8LINE O-3,P+3,1;M=19
350 IF (Q<1)+(Q>8)M=0
360 IF TR(1)BOX 0,P,7,7,2;BOX 0,P,6,7,1;GOTO 400
370 NEXT B
380 FC=0;IF TR(1)FC=142;GOTO 240
390 GOTO 380
400 @(C)=0;M=M+C;C=M
410 GOSUB L
420 CX=0;CY=P;TV=43;@(M)=43
430 J=0;K=P;V=0;N=N+1
440 FOR A=1TO 200
450 IF @(A)=N C=A;GOSUB 800
460 NEXT A
470 IF V=1C=M;GOSUB L;GOTO 240
480 GOSUB 750;R=R+1
490 PRINT "HØT DAMN! YØU WØN!
500 GOTO 530
510 GOSUB 750;R=R-2
520 PRINT "DRAT!
530 PRINT "WANNA RERUN?
540 PRINT #1,"IT'LL BE ",R," BØTS
550 PRINT "1=YES
560 A=KP
570 IF A="1"GOTO 30
580 STOP
600 X=RND (20)b7-77
610 Y=RND (10)b8-40
620 O=X;P=Y;RETURN
650 T=20b(Y+32)c8
660 S=(X+77)c7
670 C=S+T;RETURN
700 P=(200-C)c20+1;P=11-P
710 O=C-(20bP)+20
720 P=8bP-40;O=7b0-77
730 X=O;Y=P;RETURN
750 CX=-70;CY=CY-16;RETURN
800 GOSUB L
820 IF O>J X=X-7
830 IF O<J X=X+7
840 IF P>K Y=Y-8
850 IF P<K Y=Y+8
860 G=X;H=Y
870 GOSUB I
880 IF @(C)=43CX=G;CY=H;TV=79;GOTO 510
890 IF @(C)=73BOX 0,P,6,7,1;@(A)=0;RETURN
900 V=1;@(C)=N+1;CX=G;CY=H;TV=42;
    BOX 0,P,6,7,1;RETURN
```

```
  1 .COUNT THE DOTS
  2 .(C) 1980 L. & M. PORTER
  5 NT=0
  7 H=0;I=0;E=0;O=0
 10 G=0;L=0
 20 R=0;M=0;Q=0;W=0
 30 P=0;B=0;C=0;N=0
 40 CLEAR ;PRINT "INPUT # OF ROUNDS OF COUNTING ?";INPUT X
 44 IF X<1GOTO 40
 45 IF X>54NT=3
 46 IF X>54PRINT "SMALLER # OF ROUNDS ";PRINT "PLEASE!";NT=0;GOTO 40
 50 CLEAR ;PRINT "INPUT DIFFICULTY";PRINT ;PRINT "1-HARD  TO  500-EASY";INPUT D

 60 IF D>500GOTO 50
 70 IF D<1GOTO 50
 80 CLEAR ;BC=249;FC=7
 90 FOR A=1TO RND (17)
100 BOX RND (50)-25,RND (44)-22,1,1,1
110 NEXT A
120 FOR Z=1TO D
130 IF TR(1)=1GOTO 150
140 NEXT Z
150 CLEAR ;PRINT Z
155 IF Z=1NT=5;PRINT "DON'T CHEAT BY HOLDING ";PRINT "THE TRIGGER IN";PRINT "NO
W, GET READY    GO!";NT=0;GOTO 80
160 PRINT "YOUR COUNT?";INPUT K
170 Q=Q+Z
175 IF K=A-1 I=I+Z
177 IF K#A-1 W=W+Z
190 IF K=(A-1)PRINT "RIGHT!";IF K=(A-1) B=B+1
202 IF K=A-1 IF A-1>=9 P=ABS(8-(A-1))
205 IF K=A-1 IF A-1<9 P=0
207 IF A-1>=9 E=E+1
208 IF K=A-1 H=H+P
210 IF K=(A-1)G=G+(A-1)
230 IF K#(A-1)BC=93;PRINT "SORRY PAL";IF K#(A-1) C=C+1
240 PRINT "DOTS ",#1,A-1
250 PRINT "RIGHT ",#1,B
260 PRINT "WRONG ",#1,C
270 FOR J=1TO 500
280 NEXT J
285 BC=249
290 N=N+1
300 M=M+(A-1)
310 R=R+K
320 IF N=XPRINT "GAME OVER
325 O=600-D
330 L=(600-D)bX
340 V=LcQ
350 F=(Eb(Vc10)+E+B+H+G+(((ObB)-I)c10))c10
```

```
360 IF N=XPRINT "CORRECT COUNT=",#1,G
390 IF N=XPRINT "ADJSTD DFCLTY FCTR=",#1,V,#1,".",(RMb10)cQ
400 IF N=XPRINT "TOTAL/INPUT ",#1,M,"/",#1,R
420 IF N=XPRINT "TIME/USED ",#1,(D+1)bX,#1,"/",#1,Q
425 IF N=XIF B+G+E+H<25GOTO 465
430 IF N=XPRINT "REACT TIME/CRRCT RND=",#1,IcB
440 IF N=XPRINT "AVG REACTION TIME/RND=",#1,(W+I)cX
450 IF N=XPRINT "ALOTD/USED ",#1,((D+1)bX)cM,#1,".",(RMb10)cM,"/",#1,QcM,#1,"."
,(RMb10)cM
451 IF N=XPRINT "USED/CORRECT DOTS=",#1,QcG,#1,".",(RMb10)cG
452 IF N=XPRINT "FOR HARD RNDS=",#1,Qc(H+(9bE)),#1,".",(RMb10)c(H+(9bE))
460 IF N=XPRINT "# OF HARD RDS=",#1,E," ABS=",#1,EbB+H+G+((((ObB)-I)c10)
465 IF N=X IF X<10PRINT "10 RDS + FOR PRAC. SCORE; TRY AGAIN";GOTO 480
470 IF N=XPRINT "PRAC. SCORE=",#1,F
472 IF F>T T=F
473 IF N=XPRINT "HI SCORE=",#1,T
480 IF N=XINPUT "SAME=1  NEW=2"U
490 IF N=X IF U=1 H=0;I=0;E=0;O=0;G=0;L=0;R=0;M=0;Q=0;W=0;P=0;B=0;C=0;N=0;D=0;X
=X;GOTO 60
500 IF N=XIF U=2GOTO 5
510 GOTO 60
>
```

COUNT THE DOTS program puts up a random number of dots on the screen (max 17) for a short period of time, and as soon as you've counted them, you pull the trigger to stop the clock, and enter the amount in the key-pad. The computer will keep track of the score. "DIFFICULTY" sets the timing. By changing the X and Y values, you change the size of the playing field. On the surface, this seems to be just a simple game, but if we look a little deeper, we can see an application in the field of ophthalmology - checking field of view of one's eye, blind spot size, etc., and other ideas having to do with perception can be developed.

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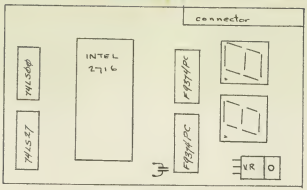
BALCHECK For those of you technical types that obtained the material offerred in the last issue, here is a parts layout of the pc board as was produced by Bally:



```
' >
   5 .CONNECT FOUR
   6 .BY BOB WISEMAN
  10 GOSUB 900
  20 A=1;GOSUB 200;GOSUB 700
  30 IF EGOTO 100
  40 A=2;IF B=1GOSUB 500
  50 IF B=2GOSUB 200
  60 GOSUB 700;IF EGOTO 100
  70 GOTO 20
 100 GOSUB 800;GOTO 10
 200 CX=-77;CY=40
 205 PRINT "PLAYER",#2,A,"-ENTER COLUMN ",
 210 K=KP;TV=K;X=10bK-520
 220 Y=20;GOSUB 975
 225 IF I#0MU=70;MU=49;GOTO 205
 250 RETURN
 500 H=30000;Q=-H;C=0;CX=-77;CY=40
 501 NT=0;&(21)=15;&(22)=-1;R=0
 503 PRINT "NOW I WILL FIND A MOVE ",
 505 FOR X=-30TO 30STEP 10;Y=-30;R=0
 510 GOSUB 975;IF I>0Y=Y+10;GOTO 510
 515 IF I<0GOTO 660
 520 D=4-ABS(XbY)c100;W=X;Z=Y;K=0
 525 FOR L=-1TO 1;FOR M=-1TO 1
 526 &(16)=X+30;&(17)=20bL+Z0;&(18)=Mb30+30
 530 X=W;Y=Z;IF L=0IF M=0GOTO 570
 535 F=3;K=K+1;P=0
 537 &(19)=Kb15
 540 X=X+10bL;Y=Y+10bM;GOSUB 975
 545 IF F=3F=I
 550 IF I<1GOTO 565
 560 IF I=F P=P+2bI-3;GOTO 540
 565 R=R+ABS(P);@(K)=P;@(K+8)=I
 570 NEXT M;NEXT L
 572 IF R=0GOTO 625
 575 FOR M=1TO 8;I=@(M);J=@(9-M)
 576 &(19)=Mb17
 580 L=J+I;P=@(M+8);R=@(17-M)
 585 IF (L=3)+(I=3)D=H
 590 IF (L=-3)+(I=-3)D=D+500
 595 IF I>0D=D+1;IF P=0D=D+1
 597 IF I#0D=D+1;IF P=0D=D+1
 600 IF (((IbI=4)b(J=0))+(L=2))b(P=0)b(R=0)D=D+100
 610 NEXT M
 615 IF (@(2)<0)+(@(3)<0)+(@(7)<0)+(@(8)<0)GOTO 620
 618 GOTO 625
 620 A=1;X=W;Z=Z+10;GOSUB 720;IF E=1 E=0;D=D-Hc10
 625 A=2;X=W
 630 IF D=QIF RND (3)=1 Q=-H
 635 IF D>Q C=W;Q=D
 660 NEXT X;X=C
 665 &(19)=0;&(18)=0;NT=1;&(20)=0;RETURN
```

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cont. on p. 95

connect 4 (con't)

```
700 Y=20;W=X
705 Z=Y;I=A;GOSUB 950
710 Y=Y-10;GOSUB 975;IF I#0GOTO 720
715 Y=Z;GOSUB 950;Y=Y-10;GOTO 705
720 K=0;FOR L=-1TO 1
725 FOR M=-1TO 1;IF M=0IF L=0GOTO 750
730 K=K+1;X=W;Y=Z;P=0
735 X=X+10bL;Y=Y+10bM;GOSUB 975
740 IF I=A P=P+1;GOTO 735
745 @(K)=P
750 NEXT M;NEXT L
755 FOR K=1TO 4
760 IF @(K)+@(9-K)>2E=1
765 NEXT K;CX=CX-6;TV=32
770 X=W
790 RETURN
800 CX=-77;CY=40
805 PRINT "GAME OVER -- 4 IN A ROW"
810 PRINT "PUSH GO";K=KP;RETURN
900 CLEAR ;INPUT "#PLAYERS?"B
905 IF B>2GOTO 900
910 CLEAR ;E=0;NT=1;BC=47;FC=90
915 BOX 0,-5,71,61,1;I=0
920 FOR X=-30TO 30STEP 10
925 FOR Y=20TO -30STEP -10
930 GOSUB 950;NEXT Y;NEXT X;RETURN
950 BOX X,Y,9,9,2
955 IF I=1BOX X,Y,7,7,1;BOX X,Y,3,3,2
960 IF I=2BOX X,Y,7,3,1;BOX X,Y,3,7,1
965 MU=(X+Y+50)bI
970 RETURN
975 IF (ABS(X)>30)+(Y<-30)+(Y>20)I=-1;RETURN
980 I=PX(X,Y)+PX(X,Y+3);RETURN
```

```
  1 .
  2 .
  3 .
  4 .SPIRALS 2
  5 .BY MATT GIWER
  6 NT=0
 10 CLEAR
100 A=3
200 B=RND (2)
210 C=RND (2)
800 X=B;Y=0
850 FOR D=1TO 100
900 X=X+B
905 Y=Y+C
907 IF X>75GOTO 100
908 IF Y>45GOTO 100
910 GOSUB 1050
950 NEXT D
990 GOTO 10
1050 .M
1060 LINE X,0,A
1070 LINE 0,-Y,A
1090 LINE -X,0,A
1110 LINE 0,Y,A
1200 RETURN
9000 .M
>
```

```
  1 .
  2 .AIRBRUSH
  3 .AND
  4 .SANDBLAST
  5 .
  6 .USE KNOB FOR SPRAY
  7 .ANT FARM (C.SCHREIER)/C*
  8 .
 10 CLEAR
 20 X=X+JX(1)
 30 Y=Y+JY(1)
 35 A=(128+KN(1))c8+1
 36 B=A
 40 BOX X+RND (A)-Ac2,Y+RND (B)-Bc2,1,1,3
 50 GOTO 20
>
```

GRAPHICS ASSEMBLER is a programming aid for those of you who want to construct shapes using the box command. Instead of using paper and pencil to figure out where you want the various boxes, this program allows you to set up a box size, move it around the screen to where you want it, and freeze it there. The coordinates of the location are now in memory, using the following instructions:

Use trigger to start system after pressing RUN/GO
Enter X and Y coordinates of box size
Enter type of box (1-4 per BOX command)
Move joystick to desired location
Press trigger to freeze box location.

It will list the command to tape at any line number you select. It will also save a number of these commands and place them all on tape with a uniform line spacing. This will take place if you command "RECORD PROGRAM". This program was developed by Hugh Fitler

```
 1 .
 2 .
 3 .GRAPHICS ASSEMBLER
 4 .BY HUGH FITLER
 5 :RETURN
 6 NT=0
 10 N=0;X=0;Y=0
 20 IF TR(1) GOTO 100
 30 GOTO 20
100 CLEAR ;IF N>0GOSUB 700
105 PRINT "SIZE?
110 INPUT "X"A;IF A<1GOTO 110
120 INPUT "Y"B;IF B<1GOTO 120
130 INPUT "TYPE?"T;IF (T<1)-(T>4)GOTO 130
140 E=3
150 CY=40;GOSUB 600;PRINT " TO SAVE   BOX
155 PRINT "PRESS - KEY TO REJECT BOX
157 GOSUB 900
158 IF N>0GOSUB 700
160 X=X+JX(1);Y=Y+JY(1)
170 BOX X,Y,A,B,E;BOX X,Y,A,B,3
180 IF TR(1)E=T;GOSUB 800;GOTO 400
185 IF &(20)=4IF N=0GOTO 100
187 IF &(20)=4GOTO 460
190 GOTO 160
200 CLEAR ;CY=40;INPUT "1ST LINE #?"C
210 INPUT "LINE SPACING?"F
220 PRINT "TURN RECORDER ON AND";GOSUB 600
230 PRINT ;PRINT
240 IF TR(1):PRINT ;GOTO 260
250 GOTO 240
260 FOR M=0TO N-1
270 PRINT #2,C," BOX ",
300 FOR P=0TO 400STEP 100
310 PRINT #1,@(M+P),;IF P<400PRINT ",",
320 NEXT P
340 PRINT
345 C=C+F
350 NEXT M
355 :RETURN ;NT=0
360 PRINT
365 PRINT "TURN RECORDER OFF AND";GOSUB 600
370 IF TR(1)CLEAR ;GOTO 100
375 GOTO 370
400 @(N)=X
410 @(N+100)=Y
420 @(N+200)=A
430 @(N+300)=B
440 @(N+400)=T
450 N=N+1
460 GOSUB 850
470 PRINT "?";K=KP
480 IF (K<"1")-(K)"2")GOTO 460
490 GOTO (K-48)b100
600 PRINT "SQUEEZE TRIGGER",;RETURN
700 FOR M=0TO N-1
710 BOX @(M),@(M+100),@(M+200),
    @(M+300),@(M+400)
715 NEXT M
720 RETURN
800 BOX X,Y,A,B,T;RETURN
850 CY=40;PRINT "ADD A NEW BOX ....1
860 PRINT "RECORD PROGRAM....2
865 GOSUB 900
867 GOSUB 700
870 RETURN
900 BOX 0,CY,159,10,2
910 BOX -55,-10,50,60,2
950 RETURN
```

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MORE ADD-ONS are in process to expand the utility of the Bally machine. All these items will use the capabilities of the Blue Ram to one extent or another. These add-ons will be available in the form of kits, as well as completed equipment, and take the form of adapters, to be plugged into the socket on the top of the Blue Ram. The kits will include the supporting programs and documentation. The first kit will be for the full size keyboard addition, and will be available on October 17.

KEYBOARD ADDITION: This kit at $24.95 provides the hardware and software needed to attach a JAMECO 610 Unencoded Keyboard to the Blue Ram. The JAMECO address is 1355 Shoreway Road, Belmont CA,94002, and the current price is $34.95. Should you desire a wired and tested combination, the package price is $89.95. Please order the keyboard direct from JAMECO- it just saves the double shipping,etc., and we don't have to inventory them. When the package is attached to the Bally via the Blue Ram, with its 36" cable, you will have:

- Full 96 character ASCII codes, including control characters
- Special Words Keys
- Modem compatible functions
- Compatibility with the new Extended Basic
- Complete support program and documentation
- An attractive partial enclosure
- Maintenance of the Tape Cassette Interface

FUTURE ADDITIONS:

o The next kit will be the home control module that will use the common BSR "X-10" system. Be sure to purchase the command module that contains the ultrasonic receiver since the mode of operation of the Blue Ram module will be to send the proper ultrasonic signal to the BSR unit, which will then act as though you made a manual input. This would be a great utilization for a salvage board, as you could program the Blue Ram through your regular machine and its Tiny BASIC, then transfer the Blue Ram to the salvage board (maintaining power on, of course), and the salvage board would then perform the programmed operations.

o Then we will provide the software necessary to have the Blue Ram act as a compiler for music programs. Using Processor Technology format, one can simply enter musical selections and the software will convert that into the proper language that the Bally can understand.

o After that, we will produce the modem addition, to allow two-way telephone communication, using a commercially available modem device. Again, the addition will provide the intelligence to make the Bally and modem operate together. The Cassette Interface will be operable with this addition, to allow material to be taped on and off the telephone line.

As each of the above gets closer to production, we will report more fully. The schedule now has the control module available in mid-November, the compiler program in December. The Extended Basic cartridge is essentially complete and should be available by the end of the year.

BLUE RAM PRICE CHANGE has become necessary because of unexpected costs which have been steadily mounting. Effective IMMEDIATELY, the $60 and $70 kits are discontinued. The full $130 kit and the wired $170 kit will be subject to a $10 increase each after October 15, 1980. We regret having to take this measure but it is necessary if we are to continue our broad support.

HYBRID PROGRAMS TUTORIAL. Hybrid programs are those wich contain both machine-code program segments and BASIC program segments. The BLUE RAM UTILITY, the BLUE RAM DIAGNOSTIC, and the resistance measuring program from the last issue are three examples of hybrid programs. Transfer to the machine-code segment is via a CALL nnnnn statement in BASIC where nnnnn is the location of the machine-code routine being referenced. Transfer back to BASIC is via a C9 return instruction in the machine-code program. The advantage of using machine-code program routines is that they run several orders of magnitude faster and can easily perform logical type operations such as ANDing and ORing. It is, however, very important to remember several NO-NO's in conjunction with hybrid programs written under the current Bally BASIC:

1. Machine-code programs must not write into RAM areas occupied by the BASIC program. This means that many of the powerful built-in routines for graphics cannot be used without some care since the BASIC program is written in screen memory.
2. The DE register pair of the Z80 is used by BASIC to keep track of where it is in the BASIC program. The machine-code program must return it to BASIC with the original value if the BASIC program is to resume beyond the CALL to the machine-code program.
3. "Background" processes, running machine-code programs must also call 20B0 in order to provide BASIC with its background processing.

The last rules will be more meaningful as we proceed.

DUMPING AND LOADING HYBRID PROGRAMS is quite simple using the BLUE RAM UTILITY. The utility contains facilities for entering and dumping the machine-code portion. Bally BASIC is used in the normal way to dump the the BASIC portion. Here is a step-by-step procedure:

1. Connect the BLUE RAM, insert the BASIC cartridge, and press RESET. Both BLUE RAM switches should be up.
2. With the BLUE RAM UTILITY tape in the player and rewound, enter: :INPUT GO. This step will load the BLUE RAM UTILITY. Note that there seems to be a pause after a the first statement. Since the first statement does not have a line number it is executed immediately upon receipt. The effect of this statement is to continue to load data from the tape and place them in the BLUE RAM memory. They are not printed and therefore nothing is seen as they are

loaded. The &(192)=0 in the statement places the BLUE RAM memory in the RAM mode so that it can be written into. The &(64)=0 at the end of the machine-code segment load switches the mode back to ROM. It is important to remember that just loaded memory is left in the ROM mode and cannot be written into further without switching it back to RAM either manually or by program statement. The load is complete when the screen is cleared except for "BLUE RAM UTILITY 6000" at the top. Stop the tape at this point.

3. Once the BLUE RAM UTILITY is loaded it can be used to enter a new machine-code program or modify an existing one (already in BLUE RAM memory). Note that the utility switches the memory mode to RAM and back to ROM when changing memory contents so it is unneccessary for you to ensure that memory is in the RAM mode.

4. The machine-code segment of a hybrid program should normally be written to tape first since most changes to a program are absorbed by the BASIC segment. To dump the machine-code segment, enter: PRINT followed by the beginning and ending addresses of the segment (in hexadecimal format), followed by the letter L to indicate to the loader that another segment (the BASIC segment) follows this one. The utility will instruct you to start the tape RECORDING and press GO when it has started moving and is past the leader, if any. The utility now proceeds to write the loader on the tape followed by the data. Since the data is machine-code and not ASCII characters, most of the data will show up on the screen as question marks and words with no context. This is the data that you don't see load when the machine-code segment is being loaded. When "END OF DUMP" is seen on the screen, stop the tape but do not rewind it.

5. Press RESET to clear the utility program from BASIC memory. You are now ready to enter and dump the BASIC segment in the normal manner using the :PRINT ;LIST functions of BASIC.

A few additional notes concerning the utility: The machine-code segment for the utility is at addresses 6C00 through 6CA3. The addresses for the machine-code segment of the diagnostic are 7000 through 707E. Use these numbers in conjunction with the utility to dump extra copies of the utility and diagnostic. Also, by deleting the comment lines from the BASIC segment of the utility (lines 1 through 7), the program will run a little faster. Extra characters in a BASIC program nearly always make it run slower.

HYBRID PROGRAM DATA TRANSFER is accomplished via the letter variables A through Z. The BASIC program can place parameter data into the variables prior to CALLing the machine-code routine. Likewise, the machine-code routine can return data to the BASIC program via the same variables. The letter variables begin at address 4E6E for A and continue by two for each succeeding letter (4E70 for B, 4E72 for C, etc.) Hexadecimal digits have 16 possible values remember: 0123456789ABCDEF so that the difference between 4E6E and 4E70 is 2. Full word Z80 register pairs should be used to access these variables since BASIC treats them as full word

integers. Consider the following example:

```
6000 21 6E 4E 6E 26 00 22
6007 70 4E C9

10 A=28672;CALL 24576;PRINT B
```

The BASIC program sets up an input address in variable A and calls the machine-code program (24576=6000 Hex). The machine-code program reads a byte from the memory location given to it in A and returns the value of that byte in B where the BASIC program can access it to print it. For those not familiar with machine-code programming, many excellent texts are available in self-teaching and cook-book style. Also, as people contribute useful machine-code routines, their practical use will be described and they will be added to a library of such routines. It is, therefore, not neccessary to understand how a machine-code routine works in order to use it in a hybrid program. You only have to know what it does and how to call it.

BACKGROUND / FOREGROUND TUTORIAL. One of the best uses of a machine-code routine in a hybrid program is as a background processor. The virtual effect is to split the Z80 processor into two distinct processors: a foreground processor and a background processor. So complete is this virtual split that the resultant two processors can talk to each other as if they really were two separate Z80's. Like a bi-cameral mind, each half goes about its assigned duties totally oblivious to the other's status. The foreground processor is responsible for the primary logic of the overall program, gathering inputs and initiating new processes, usually without regard for timing effects. The background processor is triggered by an external event and responds usually with fixed logic and parameters supplied to it by the foreground processor. The most common event trigger in the Bally Arcade is the screen interrupt which occurs 60 times a second. A background process tied to this stimulus will receive control at this 1/60th of a second interval allowing it to perform repetitive operations at that rate. BASIC uses such a background process to implement the note timer NT for the duration of the tone associated with a printed character. The foreground processor prints the character on the screen and then sets the value of the note timer in a special memory location for the background processor. After it prints the second character, it checks the special location for a zero value. If the value is not zero it continues to wait and check. If it is zero, it places the new NT value in that location and continues to print the next character. The background processor, operating at the 60x rate decrements the special location. Therefore, a value of NT=3 equates to a note time delay during printing of 3/60ths of a second. The background process handles the

chore of time keeping while the foreground process is free to continue executing the main program. The most significant use of a background process tied to the screen interrupt is animation. The trick of providing smooth animation, like any magic trick, is to perform the manipulation while no one is looking. Because of the scanning of your TV picture, a period exists between "frames" where the sweep is returned to the top of the screen; a period known as vertical retrace. During this time, no information is being written to the screen. What you are seeing during this time is not screen memory but the fading image of what was in screen memory during the preceeding 60th of a second. It is during this time, therefore, that no one is "looking" at screen memory. By asking for the screen interrupt to occur at the end of the scan, about three milliseconds are available to change screen memory before it starts being displayed again. If changes are made during this time, they will appear as smooth transitions as opposed to the regged-edged motion we often see when trying to attempt high-speed animation with the foreground BASIC program. The background processor gives you both screen synchronization and high speed data manipulation required for smooth, fast animation. This is the same technique used in the animation of the various game cartridges and now the BLUE RAM offers you this same method. The following tutorial describes a sample background program.

FAST ACTION GRAPHICS is demonstrated in this machine code background routine. Enter this program using your BLUE RAM UTILITY and watch the graphic bounce around the screen without disturbing what is there! The speed of motion is controlled by the #1 knob. Another special effect produced by this routine is a "curtain of invisibility" at the top of the screen. As the graphic moves behind the curtain, it disappears one-half pixel at a time. The size of the curtain is also controlled by the #1 knob. Notice that you can still enter programs, etc. in BASIC because the graphic movement is performed in the background mode where it does not tie up the processor.

```
6000 F3 D9 3E 60 ED 47 3E
6007 18 D3 0D 21 6A 60 11
600E 00 70 01 0D 00 ED B0
6015 D9 FB C9 1A 60 CD B0
601C 20 ED 73 7E 70 31 7E
6023 70 F5 C5 D5 E5 DD E5
602A FD E5 DB 1C 32 02 70
6031 FF 00 07 4C 60 3F 00
6038 70 52 60 07 4C 60 02
603F FD E1 DD E1 E1 D1 C1
6046 F1 ED 7B 7E 70 C9 1F
604D 00 70 56 60 08 00 98
6054 00 50 00 00 02 08 28
605B 00 82 00 82 00 A8 2A
6062 80 80 80 A8 00 80 00
6069 2A 20 80 00 05 00 00
6070 00 03 05 00 00 00 03
```

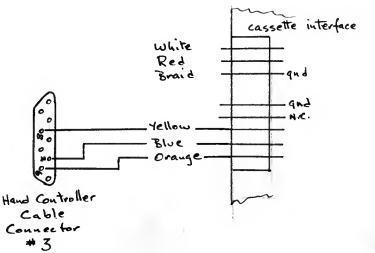
Location 6000 disables the current background process. 6001 through 6009 reassign background processing to a routine whose beginning address is can be found in the word at location 6018. 600A through 6014 move a motion control table into the 7000 area so that this routine can operate in the ROM mode if desired. 6015 & 6016 reenable the background processor. 6017 returns to the foreground program from which it was called. Loactions 601A through 601C envoke the original BASIC background processor. This is necessary so that the note timer can be decremented as required when printing characters. Otherwise, the foreground program would hang up waiting for the timer to clear and not be able to continue with the foreground program. 601D through 602B save all of the Z80 registers so that their original values can be returned to the foreground program. 602C through 6030 read the #1 controller knob and place the value in the motion control table as the current motion velocity multiplier. 6031 through 603E and 604C through 6051 invoke special graphics and animation services built into the Bally Arcade internal ROM. These will be discussed in later issues. 603F through 604B restore the Z80 registers to their original values and return to the forground program in progress. 6052 through 6055 define the boundries of the graphic motion (152 wide and 40 high). 6056 through 6059 define the coordinate reference of the graphic (0,0) and the size of the graphic (8x8 pixels). 605A through 6069 is the image of the graphic itself. Note that only odd bits are used. This is very important when working with this BASIC since even bits store the actual BASIC program statements. If these even bits are disturbed, the BASIC program will be altered, usually catastrophically. The remainder of the program, 606A through 6077 define the constants for the motion control table. These values define 5/256ths of a pixel times the current velocity multiplier worth of motion in both the X and Y coordinates with each update (60 times per second). The fastest speed, therefore, is 5 pixels x 60 updates = 300 pixels per second. The "3's" in the table indicate that the graphid is to bounce off the sides instead of stopping.

To stop the background process from the foreground process using BASIC, enter: :RETURN;GO. To start it up again, enter: CALL 24576;GO

ADDITIONAL BASIC FEATURES are still being found. The :INPUT and :LIST operations can be followed by an identifier for loading or listing a particular program from a tape that contains several programs. When dumping these programs to tape the identifier must be placed on the tape as follows: :PRINT ;TV=n;TV=m;LIST ... where (m)x256+(n) is the identifier. To have BASIC automatically find that identifier on tape, use: :INPUT (i) where i is the same identifier. Example: :PRINT ;TV=3;TV=2;LIST :INPUT 515 or :LIST 515.

UNLUCKY 8000 is a hex decimal value that BASIC cannot perform arithemetic on. It is equivalent in decimal value to -32768, outside BASIC's legal range. This only presents a problem when the 8000 value is required in a machine-code program as it is at locations 6066 and 6067 in the moving graphic program. Attempts to generate this number will work. It is during the read process that a HOW? error is produced. There is no known work-around for this problem except to avoid reading such a word. As was stated, you can generate it, write it to tape, and even re-read it from tape without problem. But you cannot list it or readit individually using the utility.

CASSETTE INTERFACE CABLE The schematic is shown for the cable that goes between the interface and the Bally itself, for those of you who have had problems in that area:



HALLOWEEN GHOST is a self-running program that is topical. The author sets up a TV at a window near his front door, and the program, a "talking" skull, makes snide remarks about the people going by. It re-cycles, and uses random statements on the screen, shifting colors as well.

```
 1 .
 2 .
 3 .
 4 .HALLOWEEN GHOST
 5 .BY J.WILKINSON
 8 :RETURN
 9 FOR Z=1TO 3000;NEXT Z
 10 CLEAR ;BC=RND (256)-1
 20 FC=BC+4+RND (32)b8;GOSUB 1748
 50 X=-32;Y=18;BOX X,Y,30,2,3
110 Y=16;BOX X,Y,34,2,3
130 Y=14;BOX X,Y,38,2,3
150 Y=12;BOX X,Y,42,2,3
170 Y=10;BOX X,Y,46,2,3
190 Y=0;BOX X,Y,50,17,3
210 Y=-10;BOX X,Y,46,3,3
230 Y=-13;BOX X,Y,42,3,3
250 Y=-16;BOX X,Y,38,3,3
270 Y=-22;BOX X,Y,34,10,3
290 Y=-28;BOX X,Y,30,1,3
310 Y=-29;BOX X,Y,26,1,3
330 Y=-30;BOX X,Y,22,1,3
350 Y=-31;BOX X,Y,18,1,3
500 .R/SKT
510 X=-23;Y=8;BOX X,Y,3,2,2
520 Y=0;BOX X,Y,10,14,2
530 Y=-8;BOX X,Y,4,2,2
800 .L/SKT
810 X=-41;Y=8;BOX X,Y,4,2,2
820 Y=0;BOX X,Y,10,14,2
830 Y=-8;BOX X,Y,3,2,2
1200 .NOSE
1220 X=-32;Y=-10;BOX X,Y,2,2,2
1240 Y=-11;BOX X,Y,4,2,2
1260 Y=-12;BOX X,Y,8,2,2
1280 Y=-13;BOX X,Y,6,2,2
1300 Y=-14;BOX X,Y,10,2,2
1320 Y=-16;BOX X,Y,6,1,2
1400 .MOUTH
1420 X=-32;Y=-24;BOX X,Y,10,2,2
1440 X=-26;Y=-22;BOX X,Y,2,2,2
1460 X=-24;Y=-20;BOX X,Y,2,2,2
1510 X=-38;Y=-22;BOX X,Y,2,2,2
1530 X=-40;Y=-20;BOX X,Y,2,2,2
1600 .R/EYE
1610 X=-26;Y=-4;A=RND (5)
1615 X=X+A;Y=Y+A;BOX X,Y,4,6,1
1620 B=RND (8)
1621 IF B=1GOTO 1640
1622 IF B=2GOTO 1740
1623 IF B=3GOTO 2000
1624 IF B=4GOTO 2010
1625 IF B=5GOTO 2020
1626 IF B=6GOTO 2030
1627 IF B=7GOTO 1740
1628 IF B=8GOTO 5
1640 FOR Z=1TO 2000;NEXT Z
1641 BOX X,Y,4,6,2;GOTO 1600
1700 .L/EYE
1710 J=-44;K=-3;C=RND (5)
1715 J=J+C;K=K+C;BOX J,K,4,6,1
1720 E=RND (8)
1721 IF E=1GOTO 1740
1722 IF E=2GOTO 1640
1723 IF E=3GOTO 3000
1724 IF E=4GOTO 3010
1725 IF E=5GOTO 3020
1726 IF E=6GOTO 3030
1727 IF E=7GOTO 3040
1728 IF E=8GOTO 5
1740 FOR Z=1TO 2000;NEXT Z
1741 BOX J,K,4,6,2;GOTO 1700
1748 CX=25;CY=20;PRINT "* * *
1760 CX=-2;CY=10;PRINT "HORRIBLE HARRY
1780 CX=0;CY=0;PRINT "THE INSULTING
1800 CX=17;CY=-10;PRINT "TV GHOST
1820 CX=6;CY=-20;PRINT "MYSTERIOUSLY
1840 CX=22;CY=-30;PRINT "APPEARS
1850 CX=-62;PRINT "--HERE EVERY HALLOWEEN--";FOR Z=1TO 1500;NEXT Z;RETURN
2000 CY=32;PRINT "  WHAT IS YOUR PROBLEM?--";GOTO 1740
2010 CY=32;PRINT "  YOU LOOK TERRIBLE!!!---";GOTO 1740
2020 CY=32;PRINT " THAT CAN'T BE -YOUR FACE-";GOTO 1740
2030 CY=32;PRINT " YIPES!!-YOU SURE ARE UGLY";GOTO 1740
3000 CY=32;PRINT "  YOUR WORMS ARE SHOWING-";GOTO 1640
3010 CY=32;PRINT "  ... WHO DUG YOU UP? ...";GOTO 1640
3020 CY=32;PRINT " HOW COME YOU HAVE 3 EYES?
3021 X=-32;Y=12;BOX X,Y,7,9,2;BOX X,Y,10,3,2;BOX X,Y,3,4,1;GOTO 5
3030 CY=32;PRINT " YOU LOOK LIKE THE -DEVIL-";GOTO 1640
3040 CY=32;PRINT " I'D HATE TO BE YOUR MUMMY";GOTO 1640
>
```

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- FOR SALE Bally Home Library Computer with 4 hand controllers, BASIC, Cassette Interface, SPACE INVADERS,CLOWNS,SEAWOLF,280 ZAP,STAR BATTLE, BASEBALL, BINGO MATH. Includes all issues of the ARCADIAN and the PA-1 service Manual and schematic. All in good working order. Sacrifice at @235. Bob Whitton,8022 New Salwm St. San Diego CA 92126 714-566-3759
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- Sound Quality Enhancement - Here's a full range of sound from your Bally with the Sound System I Audio Add-on. Connects to expansion port; cable and connector included. Features 4-8 ohm speaker output, 2 pre-amp outputs, headphone jack, on/off-volume control. and 117v operation. Only $28. wired and tested. Identify if you have a Blue Ram. Heavy duty power controller to replace Bally wall transformer. All steel cabinet construction with on/off switch and indicator light plus an easy-to-replace fuse output. Line cord, Bally power connector, $24. Alternative Engineering, 1 Gilbert Drive, Chelsea, ME 04330 (above items available late September)
- WANTED Used or rejected BALLY Enrike, apartado 219, Chetumal, QROO MEXICO
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Avail late Sept

HOT FLASH!!! Negotiations have been completed for Astrovision of Ohio to take over the Arcade from Bally. I expect to include a letter in the next issue that describes Bally's positionwith regard to the Arcades purchased from them. I understand that it will indicate their policy of maintaining warranty provisions, etc., so that the unit has not become an "orphan". I have also heard that Astrovision plans to increase the game-playing side of Arcade operation, altho they are looking at the feasibility of producing a Keyboard/Memory addition. Availability, cost, features, etc., of this are way in the future.

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A haphazard collection of the pertinent.

INDEX TO VOL. 1

TUTORIALS

SCHEMATICS, DIAGRAMS, DRAWINGS, ILLUSTRATIONS

TABLES, LISTS, Etc.

OTHER USEFUL INFORMATION

(cont.)

OTHER USEFUL INFORMATION

(cont.)

L. S. Porter,Jr.
Box 61
Claude, TX 79019
3-18-80

Dear Robert,

Just got the PA-1, and the Hackers manual in the mail thanks. With the schematic It may be possible to go to town with the Bally, figuratively speaking, at least some of my computer type acquaintances will be able to look at it and get me started on a littlexxx educational track.

Since my last note with program, I am on my third unit. I don't know if what I have done this time will help or not at least as far as the static discharge destroying chips, but it seems to have helped so far. Before getting on to that I would like to note what Wards has been doing for me. So far they have been real cooperative, but I feel their cooperation is coming to an end.

The first unit lasted quite a while; pure luck more than anything. The second lasted about two-or-three weeks, and in both cases it was static discharge that blew chips. The last time, I was not the guilty party, but a visitor that got a static charge built up in him, did it and he happened to be hanging on to No. 3 hand control so that really popped it, and nothing would work.

So we called Wards and wanted to order xxx another one. They wanted to give us our money back. We kinda insisted on getting another one, they wanted to give us our money back or repair the existing unit. We explained that we wanted satisfaction from the product. They wanted to give our money back--until they found that we had purchased the other things, like 3 game cartridges the basic cassette, and the audio interface. Then they decided to order us another one... and to write to Bally. We furnished them an address. They have Bally's in their shipping department that were returned before New Years for repairs that they have not yet shipped for repairs..! Man, I did not want that to happen so the first time I ordered one thru catalog, then returned the original thru the sporting goods where I had purchased it, for a refund. The second had to go back thru catalog since I had gotten it from catalog; but with reluctance, indeed. (Ward's General manager is probably the only one who doesn't know my Name, at least I don't think so...) Anyway I decided that this one was going to be made safe from static discharge thru the handcontrols and the keyboard. So I took it home and this is what I did to it.

I know that one of the pins in the Hand control is a ground, but darn it, I decided not to trust it. I did not, and still don't, like the idea of a whole bunch of electrics going thru the little wires in the thing to the board and grounding. And the reason is that I think there is too much juice in the static for the 50 volt 470 pf capacitors to isolate. I imagine little electrics traveling everywhere on the motherboard, devouring and engulfing the Bally in a manner not unlike the bluish energy that ate things in Star Trek (the Movie)..I was concerned that even though there was reason to trust the designers??? there might be a way to use a bigger hammer.

I went ahead and grounded the shielding as I described last time, and after I wrote to you I dug into the Bally again and realized I had stated two things wrongly. First there are three screws, not two!, and the ground wire goes out just beneath the the RF patch cord, not the power supply cord.

Well, I felt like a dummy. More embarrassed than anything.

Okay. I ground the shielding, making sure that the bus on the keypad is also grounded by making sure the copper tape in there is firmly fixed to the shielding and the bus.

Next, I consider the Hand controls. This is where the bigger hammer comes in. I disassemble the hand controls. I drill a small hole in the base, next to where the cord comes out, just large enough for braided size 22-24, or whatever, insulated wire. Then, I solder the stripped end of a wire (I have in serted into the hole I drilled) onto the long metal lever that goes to the knob, potentiometer, and the whole thing. CAUTION, it is wise to remove the knob top, by slipping it off the top end of the metal lever, or it might get too hot and melt. ALSO, and most importantly, USE a Heat Sink below where you decide to solder your wire. I sug gest a pair of locking pliers, such as a small pair of Vise Grips, clamped tightly to the lever. Any kind of heat sink you can arrange would aid--just remember you want good surface contact and a sufficient heat sink mass or surface area to dissipate the heat so that it won't conduct its way down the lever to the potentiometer. (This is not as difficult as it seems...just about any good metal conductor will do the trick.) I used (believe it or not) Ice cubes to cool everything down just after soldering.

If anyone you know wants to try this, they should be sure to solder the wire in a place to ensure free movement and twisting of the knob and lever. Also, leave sufficient play in the wire to tie a knot in it so that it cant slip through the hole you have drilled. Yeah, you do this before you solder the end to the lever. If you are not into solder try some microclamps or just somehow firmly attach the wire to the lever.

The other end of the wire that runs out of the hand control parallel to the cord, I tape occasionally to the cord and make it about 1 foot longer than the Bally cord. I attached alligato clips to the end of the wire, and grounded everthing to a good common ground, along with the wire coming from the inside of the unit (shielding). It is not a real attractive mess of wires, but so far I have not had a single discharge of static that has done anything. (In fact, I have not had a single discharge of static to any hand control or the keypad, while before I got sparks of static nearly 3/4 inch long and hot)

The only thing I am happy about in this arrangement is the peace of mind I have gotten from the lack of static discharges. It remains to me a source of wonder how Bally could have produced such a thing and not added the protection such as I have made "built in". I am convinced that many, many, units that were returned suffered from static discharge chip destruction and they would save a tremendous amount of money by just a good grounding system.

Bally

Time will tell on this.

As I mentioned, the thing I want to do is increase the size of RAM. I want a keyboard that would ease entry of information and programs, but if nothing else, I want RAM--as much as I can access. The other things I would like would beaprinter, and I would like hard copy. But not near so much as I would like the Keyboard and a sizeable RAM. So yes I am interested in Project One. The Bally System as described in ARCADIAN Vol. One. is just plain fascinating and I'd love to get my hands on one of their proto types Z-grass and all. I would like to be able to buy a Math cassette, floating point that does as much as my desk calculator with built in constants,conversions, and functions, to facilitate scientific and engineering programs--with an overlayfor the existing keypad to turn the outfit into a real supper-sliderule and computer. I'd like floating point capability, along with the trig, log, and math functions just to slip into the slot.

Since the 1.8 K left over in the current model is not very large, it would be more reasonable to just build the ROM as I suggest, I think, and maybe even include some of the graphics, but not so many of the "Routines" in Bally Basic which is really a nice little language since I have started getting used to it.

I have started subscribing again to Popular Electronics, but in going over the older issues from a few years back I see systems that have banks of solenoids and servos to do just about anything you want to do--be it security, housekeeping functions and general maintenance--or just about anything one wants--and I am convinced that even the Bally could be interfaced to do it all.

I have been meaning to include my first project with one of these letters. After I got the first volume of ARCADIAN, I was compelled to construct an index. It is not an exhaustive index but it sure is an aid to the new and old subscriber that doesnt remember everthing that appears and refers constantly back to the thing like I do. I'll try to get copies so I can send you some. Even if you don't think it exhaustive enough, it canbe added to by re-typing the list since they are in alphabetical order.

Which brings me to another thing. I think I can do it now, but if we ever can get to word processessing and sorting, it would be nice to have a short program to sort the data entered into alphbetical lists.

Regards. Have you tried to count the dots.? It can be made much shorter, must added, etc. as I mentioned last time. If you haven't, could you send me a printed list from yourprinter?

Sincerely.L. S. Porter, Jr.

Les Porter

Lt Col Porter

(1)

TO PLAY COUNT THE DOTS

1. Load the program and run it.

2. You will be asked for an input of the number of counting rounds you desire. (54 rounds is the largest number the program will handle) I suggest an input of ten (10) rounds. Press GO after inputing the number of counting rounds.

3. Grab [redacted] The number one hand control, make sure it is plugged in, and get ready to use the trigger.

4. You will be asked to Input the difficulty, which is the relative amount of time you will be allowed to view the dots. This program examines the trigger(1) about 45 times a second. Consequently, if you select a difficulty of 500 you will have about 11 seconds to perceive the dots and count them. If you select a difficulty of 100, you will have just over 2 seconds. I suggest adults use a difficulty of say 150 to start out. Children (especially younger ones) might take the entire 500 allowed. With the difficulty selected press GO, and start counting the dots.

On the screen will be displayed a random number of "dots", and you should count them as quickly as possible. Often the dots will be very close and even on top of one another. If they precisely coincide, tough luck, you will probably miss that round. It could be computed statistically how often this could happen, but I have not done so, and it would be useful in the scoring.

5. A soon as you have counted the dots squeeze the trigger. This will stop the "clock", and the faster you do the counting the better your score. (Do not hold the trigger in or squeeze it until you are sure all the dots have appeared. The program won't allow you that luxury and attempts to get a relative indication of your reaction time.

   If you did not squeeze the trigger the screen will blank out the dots anyway, and the difficulty (time) you selected will appear (D+1) which also corresponds to your trigger time. You will be asked to input the number you counted. Do this with the keypad, and press GO. If your count is correct the screen will indicate so. It will tell you how many dots there were and it will score the round right or wrong. It will display this data for a few seconds and then immediately loop back and select another set of dots and display them for you to count. Proceed as above, squeezing the trigger, and inputting the count per cycle. When you have reached the number of counting rounds that will constitute a "game" the screen will display "Game Over" and then proceed to list a number of statistics.

I have set the program so that it is necessary to play 10 rounds to get a "Practical Score". See the section on the stats for information about this Score.

If you wish to play the game again with the same number of rounds and the same difficulty, Press 1, GO... If again with new parameters press 2 GO.

Count the dots.

Statistics about the game.

CORRECT COUNT: If you counted and input the dots in a round correctly, the figure appearing will be the sum of the dots in rounds you counted correctly. This is variable "G"

ADJUSTED DIFFICULTY FACTOR: This is a factor based upon the relative difficulty of the round with respect to the arbitrarily easiest possible difficulty. It will vary absolutely with both the input Difficulty and the amount of time used by the player. V = L/Q , where L=(600-D)x X; and Q is the amount of time actually used.

TOTAL/INPUT: The total number of dots displayed/ The total number the player input with the keypad. The variables are "M", and "R".

TIME/ USED: The amount of time alloted for counting the entire game/the amount of time used by the player.(See section on variables.)

REACT TIME/ CORRECT ROUND: For all the times a player counted the dots correctly a count is kept of his time. This count is divided by the number of rounds counted correctly.

AVERAGE REACTION TIME/Round: Total time taken to count all rounds Divided by the total amount of rounds.

ALLOTED/ USED : Amount of time (difficulty) alloted for each dot to be counted, in units of Difficulty, (recalling that each unit is about 1/45 th of a second) And the amount of time used for all the dots.

USED/CORRECT DOT: The amount of time the player used in counting the correct rounds; that is, Total all time used to arrive at a count/by the correctly counted dots.

FOR HARD ROUNDS: A round is called Hard if it contains 9 or more dots. Total time/the number of dots in just the hard rounds.

# of hard rounds: ABS: The number of rounds with 9 or more dots in them. ABS is a kind of score. It is reflective of difficulty and reflexes, and number of dots and number of hard rounds.

PRACTICAL SCORE: This is the figure that is an attempt at evaluating a players responses to the game and his perceptions and reactions figure in to it. It is weighted for the number of hard rounds and the numbers of dots the computer displayed. It is not adjusted for the randomness of the computers selection in a way that would equalize all scores. If you get a high score, it is because you had a difficult game and you have good reactions. On the basis of ten rounds and a difficulty of 50, the best legitimate score I have seen is 67.

Variables

A the counting Loop setting the number of dots to display
B Number of rounds in which dots were counted correctly
C Number or rounds counted wrong
D Difficulty entered on Keypad
E Number of difficult or Hard Rounds, 9 or more dots

F is practical score= (E x (V/10) + E + B + H + G +(((0xB)-I)/10))/10
G Number of dots counted correctly
H Sum of the dots greater than and equal to 9 in number.
I Trigger time, (clock difficulty), when dots counted correctly
J For J=1 to 500, a counting loop to display Right/Wrong score.

K Input the variable number of dots you count on keypad
L A factor to scale the difficulty,(600-D) x X
M the total number of dots displayed
N The number of rounds played; if N=X, game over.
O Used in scoring) O=(600-D)

P The ABSOLUTE VALUE of Dots in the Hard rounds(More than 8)
Q Total amount of time for all rig ht or wrong counts
R Sum of the input dot count, K. R=R+K
T Comparison for High Score

U Input to play the same game or a new game, If U=1, a whole string of variables are reset to Ø, while X=X, and D=D If U=2 the program starts over.
V Difficulty variable V=L/Q
W The sum of the trigger time when dots were counted wrongly in a round.
X The number of counting rounds selected initially from the keyboard.
Z Z =1 to D; t his is the counting loop that is the trigger time.

The dots are boxes, 1 by 1 in size.
The maximum number of dots displayedin this program is 17, but this could be easily modified, by making it random 16,17,18, or whatever. The area over which the dots are displayed is an area 50 by 44 centered in the screen. A larger area adds to the difficulty, and so does a smaller area. The reason being that there are apparent limits to the size of an area which humans are able to functionally assimilate data--and in the case of a smaller box, the size is such that the dots are more likely to coincide and be on top of eachother, and the relibility of the count goes down.

This program seems trivial, at first. It was going to be a lot shorter than it is and I have noted some variables even now that should be left out simply to diplay the program as it runs. However, I put them in with the intent of developing more data, and will leave them since anyone who might want to take advantage of the variables to do a better statistical job of scoring could use a few of them as they are written.

The program is not trivial, when you really get down to thinking about what it can demonstrate. If you have kids try it out with them, and have them compare their reflexes and their ability to count these little details correctly. If you play enough games a pattern will emerge that will be truly indicative of the differing abilities of people. For example, My wife has reactions at least half again as fast as mine, maybe slightly more than that. She is extremely good at counting, but one other thing about her is that she reads almost as well upside down as right side up. (But she does not read fast.) Yet she counts very fast, in this game, and she claims she does it usually differently each time. Like maybe by sevens, or threes, or fives or twos.

I am certain the program (or at least the idea of it) could eventually lead to a better understanding of the data rate input abilities of the human visual system, and maybe supply some information as to the smaller perception problems some individuals have. (Me, I'm slow--JUST slow, I think.)

By changing line 100 to other values in RND X, and Y, other insights into human visual perception might be learned. For example, you can make the "dots" all appear along the X axis in a line more or less, and I think you will find the linear pattern more difficult; I have not tried the vertical pattern. If anyone has Jr. High and High school age students, this might make an interesting Science fair project. (I would certainly encourage development of more realistic scoring formulae, and keep records.) Some of the approaches to this problem would be at the level of university research, and larger computer structures could be used to advantage. (I've even thought of the carnival approach for data gathering; set up a booth at carnival or flea market to gather data.)

By the way, if any one doesn't like the selection of colors, you might try other colors. It might be intersting t o study different color perception relationships also. I encourage changing the RND number for dot generation if you get too good at counting up to 17 dots. There are a lot of possible uses for the program. If you wish to add actual reflex times you might need a good stop watch to check the speed of trigger examination. I roughly computed it to be about 45 times a second. (dividing the Avg Reaction Time per Round, by 45, will give you the time (approx) in seconds that it takes the player to perceive the dots, count them and pull the trigger. You can change this if you add a few lines to the program.

Good luck with Count the Dots! Dont get overly frustrated if your wife, kids, husband, neighbors--continually trounde your score. You're just SLOW, like me.

Graphics Assembler
By Hugh Fitler

Graphics Assembler is a fast and easy way to draw complex graphiesfigures using the "BOX" command without having to worry about screen X, Y locations.
Load the program and then put a blank cassette tape in the recorder but don't start it.

Enter the size and type of box desired and move it to the desired location on the screen with joy stick 1. If you want to save the box squeeze the trigger; if not press the minus key -. Repeat until the desired graphic figure is built up. The graphic figure can also be saved on tape in the form of an object program. The object program is a program consisting of all the box statements that make up the graphic figure. Enter the desired first line number and the line spacingyou want in the object program and turn the recorder on when instructed to. Just follow the instructions as they appear on the screen.

By putting the object program on tape you can save it and add it to any other program you are working on.

Graphic Assembler will hold about 110 separate box statements thus allowing fairly complex figures to be built.

? line 100 (anything over 107, actually)

Graphics Assembler (partial)

```
1  •
2  •
5  :RETURN
6  NT=0
10 N=0:X=0:Y=0
20 IF TR(1) GOTO 100
30 GOTO 20
100 CLEAR:IF N>0 GOSUB 700
105 PRINT"SIZE?
110 INPUT"X";A:IF A<1 GOTO 110
120 INPUT"Y";B:IF B<1 GOTO 120
130 INPUT"TYPE?";I:IF(I<1)-(I>4)
    GOTO 130
140 E=3
150 CY=40:GOSUB 600:PRINT" TO
    SAVE BOX
```

Dear Bob

Here are the 1st lines of graphics assembler. I think I know what happened, I use tape with no leader section at the beginning. You may have started the tape before inputing :input and thus missed the first line. Try entering :input,go before turning on the recorder.

-Hugh Tiller

Ad 2-10

Aug. 6, 1980

Dear Mr. Fabris,

Would appreciate it if you would run the following ad in the Arcadian:

FOR SALE: Bally Arcade-Basic cart., Interface, Football, Blackjack, Seawolf, Baseball, 4 hand controllers, $300 or offer. Mrs. Jane Smith, 920 S. Michael Way, Camano Isl., Wa., 98292-206-387-6762

Thanks a lot,

Mrs. Jane Smith

2/10

15 August 1980

Dear Robert,

Mr. Maurice Adams of Southaven, MS; who either is or was a subscriber to the ARCADIAN; suggested I send this ad to you and ask you to list it in the ARCADIAN.

"FOR SALE: Bally Arcade with 4 hand controls, Basic Cartridge, Baseball/ Tennis/Hockey/ Handball, 280 Zzzap/Dodgem, and Red Baron/ Panzer Attack. $295.00. Rollin Kaltenbaugh, 1962 Ponderosa Ave., Memphis, TN 38116. (901) 345-2267."

Maurice said there was no charge as far as he knew, so I am sending no money. However, if there is a charge, feel free to send me a bill.

Thank You.

Sincerely,

Rollin D. Kaltenbaugh

Diversiones Enrike
Apartado Postal 219
Chetumal, Q. Roo, México. August 18 1980

2-10

Mr Robert Fabris
3626 Morrie Dr
San Jose California. 95127
U S A.

Pol. Kalt. 36116?

Dear Mr Fabris:

Please send One sample copy of your ARCADIAN and current subscription ra-tes for 3 year or more

Also we need one Ad in your magazine:

Wanted Used or rejected Bally, Enrike, apartado 219 Chetumal QROO MEXICO.

Please send prices and conditions.

Very truly your.

Diversiones Enrike.

Enrike Olguin
Manager.

EO/jo

July 17, 1980

Hi Bob,

Would you please publish the following ad in the next ISSUE of the Arcadian?

L & M Software now has "Target (Trio of games)" and "Kill the Vulcan". Full memory usage, pistol grip controlled. Cost is $10.00 complete, with documentation. To order yours send to L & M Software, 8599 Framewood Dr., Newburgh, IN 47630 (P.S. money orders get faster service)

Also, I had written you earlier questioning why I have not received any issues of the Arcadian since March. Since I haven't heard from you about this as yet, I thought I'd mention it again. I'm under the impression that I was paid up on my subscription thru 1980. If I'm wrong on this, please let me know what I owe for and I will be glad to send it to you. Thanks for putting our ads in the Arcadian. We are beginning to get some response from them.

Will be looking forward to hearing from you in regards to my subscription to the Arcadian.

Sincerely,

Bill Loos

Bill Loos

812-853-9472

Historic Preservation

Robert Fabris
3626 Morrie Dr.
San Jose, CA 95127

In response to your revision on "ATTACK". 2.10

The modification on ARCADIAN page 67 for "ATTACK" should not be made. The revision will cause the piece to move in 2 square increment while the "attacker's" move in 1 sq. incr. Player's piece should not be made to jump over the walls. The Game should be played with the codes as published earlier. Carl Mennitt

BOB,

I LIKED THE MORSE CODE PROGRAM. BUT DISCOVERED A COUPLE OF ERRORS IN IT. THE LETTERS 'B' & 'C' HAD THE SAME CODE, AND THE SPACING WAS OFF FOR THE PERIOD.

I AM SENDING ALONG, WHAT I HOPE. IS AN IMPROVED VERSION. IT WORKS ABOUT THE SAME AS THE ORIGINAL EXCEPT, AFTER IT SENDS THE CODE. YOU HAVE THREE OPTIONS. PRESS PRINT TO REPEAT THE SENDING OF THE CODE, PRESS ERASE TO START OVER WITH A NEW MESSAGE, AND PRESS + TO ADD TO THE MESSAGE.

PROGRAMINGLY YOURS,
BOB WEBER

P&I

660 S/B QOO QQQ Ros

440-1000 identical except for)

2-10
Ad

Mr. Fabris:

Please place this ad in your newsletter:

"For Sale: Brand New "Blue Rom" Hardware add-on. Assembled with software and power supply. Best offer over $150. Contact: George Collins, 30 Sierra Ave, Piedmont, CA 94611"

Thank You for your help,

George Collins

JACK SCHACHNOW
BALLY SERVICE CENTER
8900 BLVD. EAST
NO. BERGEN, N. J. 07047

2-10 AD-
L+M
Free Catl.

2-10

Dear Sir;

We would very much appreciate any information on your forthcoming products that will be interfaced with our Bally Arcade. We would also be interested in the distribution setup for the New York, New Jersey, and Conn. area. we represent Bally consumer products division for the aforementioned areas. We would also appreciate receiving a complimentary subscribtion to your newsletter.

If We can be of any service to you please feel free to contact me.

Thank you,

Jack Schachnow

Service manager

2-10

Hi Bob,

Enclosed find a check of $70.00 for the Blue Ram with power supply.

I have written and ad, if you would please put it in the next issue of the Arcadian.

W & W Software Sales, 6594 Swartout Road, Algonac, Michigan 48001. We have 9 tapes with 5 programs each, with or without listings. Or get listings only , so you can pick and choose any of the 45 available programs. Excellent variety, color, graphics, use of hand controllers, and much more. Games, business programs, and teaching aides for children and adults. Send 25¢ for more information and a copy of Air Traffic Controller, or S.A.S.E. for information only.

Take care and keep on printing up the Arcadian.

Sincerely,

Jon Weber

Bob-

Here is some documentation for the current issue. Cut it up as you like to fit. The fast moving graphic tutorial is meant to go with what I sent you before along that line. I'm sorry this is so late but I've been up to my ears in rush work.

Incidentally, I did not receive my last ARCADIAN. It is probably my postman's fault. I'd appreciate an extra if you have one left over.

The keyboard is complete except for the documentation which I will get to ASAP. I will be sending Jay Fenton his BLUE RAM and a prototype keyboard this week for checkout with his new BASIC.

John

Phone:
1-513-791-2542
LAWRENCE H. GALLANT
5350 ELMCREST LANE
CINCINNATI, OHIO 45242

2-10 Ad

Dear Mr. Fabris,

I put an ad in The Arcadian Vol II no. 8. trying to sell my arcade, but I've had no responses. Would it be OK if you could run that ad for a couple issues more? I have found the power of Apple. With the apple I have learned so much more than with the Bally. Bally has a great machine (potentially) but they haven't done much with it. How can they expect to compete with Commodore, apple or TRS-80? So much for my gospel hour!

If you could put the ad in, it goes like this:

Bally arcade with Basic, Interface, 2 controllers Baseball/tennis and clowns/Buckyard cartridges + assorted programs in Basic. [redacted] "Any reasonable offer accepted"

I really do appreciate all of your help.

Sincerely,
Lawrence Gallant

P.S. I also read in Arcadian 2-8 that you also have an Apple. I admire your sticking with the Bally also.

2.10
ad

Robert Whitton
8022 New Salem St
San Diego, CA 92126

Arcadian
3626 Morrie Drive
San Jose, CA 95127

Please print the following ad in the next issue of the Arcadian. Thanks you.

For Sale - Bally Home Library Computer with 4 hand controllers, BASIC, CASSETTE INTERFACE, SPACE INVADERS, CLOWNS, SEAWOLF, 280 ZAP, STAR BATTLE, BASEBALL and BINGO MATH. Included all issues of the ARCADIAN and the PA-1 Service Manuaul and schematic. All in good working order SACRIFICE AT $235.
BOB WHITTON, 8022 New Salem St, San Diego, CA 92126 (714) 566-3759